

the regularly curved basal margin in an obtuse angle on each side. The very short elytra are shining, like the pronotum, and show traces of fine striæ but no punctures. The pygidium is smooth but for a few scattered punctures. The front femora are almost like those of the male *Pachylomera femoralis*, having a tooth near the base connected by a serrated carina with one of the two sharp teeth situated near the articulation with the tibia, and the coxa is also toothed in front. The great broad front tibia is armed with four teeth along the anterior half of the outer edge, the inner edge is serrated and above it is an upturned fringe of short hairs, while the upper face has also two small brushes of similar hairs upon its anterior half. The middle and hind tibiæ each bear a blunt spatulate terminal spur, extending beyond the tarsus in the middle legs, but only half its length in the hind ones. The hind tibia has two parallel fringes of stiff hairs directed upwards, the inner one continuous and the outer interrupted. Both pairs of tarsi are rather broad and the claws are minute, short, straight, and not divergent.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

December 4th, 1918.—Mr. G. W. Lamplugh, F.R.S.,
President, in the Chair.

The following communication was read:—

‘The Carboniferous Succession of the Clitheroe Province.’ By Lt.-Col. Wheelton Hind, M.D., B.S., F.R.C.S., F.G.S., and Albert Wilmore, D.Sc., F.G.S.

The tectonic structure of the province consists of three dissected parallel anticlinal folds in beds of Carboniferous-Limestone, Pendle-side, and Millstone-Grit age. The general direction of the axes of these folds is east-north-east and west-south-west. Dissection has exposed the lower beds of Z, C, and S age, as the tectonic axes and beds of D, P, and Millstone-Grit age occur on the flanks.

The Limestone sequence shows all the zones from Z to D. *Modiola* and *Cleistopora* phases have not been exposed, the base of the Carboniferous not being seen. The Z beds are much thickened, and not so fossiliferous as in the Bristol Province. C and S beds are, as a rule, well-bedded, with shales intercalated between beds of limestone. There are crinoidal beds of considerable thickness in places, and shell-breccias are common in S. *Zaphrentis omaliusi* indicates an important horizon in Lower C, and these

beds are characterized by numerous large gasteropods. *Productus humerosus (sublævis)* marks an equally important horizon in Upper C, as it does in the Belgian Province.

D beds are peculiar in the western part of the Clitheroe Province, and are largely represented by shales, mudstones, and thin earthy limestones; but in the north and north-east, in the Settle and Burnsall districts, thick, fossiliferous, obscurely-bedded limestones with a rich brachiopod and molluscan fauna occur.

The Pendleside Series is well developed, and practically the whole sequence is exposed on the north-western flank of Pendle Hill. This series can be subdivided into life-zones by the Goniatites.

The lower 300 feet consists of well-bedded earthy limestones with much chert, characterized by the presence of *Prolecanites compressus*. As a rule, there is a well-marked limestone horizon, which the Authors name the Ravensholme Limestone (from a farm of that name at the north-eastern end of Pendle); this limestone contains *Zaphrentis amplexoides*, *Cyathaxonia rushiana*, *Michelelinia tenuisepta*, and *M. parasitica*, and the fauna is a very important and constant feature throughout the whole province. The Ravensholme Limestone is an important part of the 'Pendleside Limestone' of the late Mr. R. H. Tiddeman.

The Pendleside Limestone is succeeded by hard, black, calcareous shales with *Glyphioceras striatum*, *Nomismoceras rotiforme*, and *Posidonomya becheri*; and these in turn by the Bowland Shales of Phillips, which contain the zones of *Glyphioceras spirale* and *Glyphioceras bilingue*.

The Upper Pendle Grit succeeds the zone of *Glyphioceras bilingue*, and is the homotaxial equivalent of Farey's Grit of the Peak Country.

An important horizon occurs between the Kinderscout and the Millstone Grit—Sabden Shales—characterized by a rich fauna with *Glyphioceras beyrichianum* and *Glyphioceras reticulatum*. It is considered probable that the well-known fossiliferous Hebden-Bridge Beds may be on this horizon rather than in the Pendleside Series.

TABLE OF GONIATITE ZONES.

	'Middle' Coal Measures.	<i>Gastrioceras carbonarium</i> von Buch.
	Lower Coal Measures.	<i>Gastrioceras carbonarium</i> von Buch.
	Upper Millstone Grit.	<i>Gastrioceras listeri</i> Martin.
	Sabden Shales.	<i>Glyphioceras diadema</i> Beyrich.
Zones of the Pendleside Series.	Shales below Millstone Grit.	<i>Glyphioceras bilingue</i> Salter.
		<i>Glyphioceras reticulatum</i> Phillips.
	Bowland Shales.	<i>Glyphioceras spirale</i> Phillips.
		<i>Glyphioceras striatum</i> Phillips.
	<i>Posidonomya becheri</i> Shales.	<i>Nomismoceras rotiforme</i> Phillips.
Carboniferous Limestone D ₂ .	<i>Prolecanites compressus</i> Sowerby.	
		<i>Glyphioceras crenistria</i> Phillips.